

College Mathematics Project Math Forum

Supported by the Connecting GTA Teachers-
SCWI Regional Planning Team

Presented by the College Math Project Team

Seneca College, King Campus

June 15, 2006



Agenda

- ❑ Impetus for the College Math Project
- ❑ Overview of CMP: goals, structure and components
- ❑ The Qualitative Component: College Policies and Program Analysis
- ❑ The Quantitative Component: Student Data Analysis
- ❑ Significance of CMP

Impetus for CMP

- ❑ **Heads of Technology concerns regarding**
 - ❑ falling application numbers
 - ❑ first semester failure rates
 - ❑ graduation rates and other Key Performance Indicators
 - ❑ accreditation requirements
 - ❑ costs of remediation
- ❑ **Secondary School Mathematics Curriculum Review**
 - ❑ the “MCT4C experience”

College Technology Programs-A Primer

- ❑ Diverse program mix –
 - ❑ apprentice ...aviation... applied science
...engineering technology;
 - ❑ 1, 2 and 3 year certificate and diploma programs
- ❑ Main goal - to obtain employment in chosen field
- ❑ Additional goal - many continue towards a degree
- ❑ Combination of theory and hands on education
- ❑ Advisory Committees play a key role
- ❑ Outcomes based
- ❑ Provincial and professional accreditation standards must be met

Goals of CMP

- ❑ To examine secondary school mathematics pathways and achievement, and first semester college mathematics achievement of students enrolled in applied science and technology programs.
- ❑ To use the information to improve the transition between secondary school and college technology mathematics on a system wide basis, thereby improving success rates in first year college mathematics.

Goals of CMP

- ❑ A seamless mathematics experience from K to College for students who wish to pursue a career in applied science, engineering technology, skilled technology trades or information technology
- ❑ A structure that enables regular dialogue between colleges and secondary schools - to improve math experience at the secondary and post secondary level through shared best practices, better curriculum alignment, assessment strategies, remediation strategies, etc
- ❑ A database that will inform school boards and government of how we are doing

Structure of Pilot B

- ❑ **Funded by:** School/College/Work Initiative (SCWI)
- ❑ **Scope:** more than 5000 students enrolled in 139 technology programs at 6 colleges - Sheridan, George Brown, St. Clair, Fanshawe, Georgian and Seneca
- ❑ **Project team:** - Laurel Schollen, Hassan Assiri, Seneca; Trish Byers, Graham Orpwood, Margaret Sinclair - York University
- ❑ **Steering Committee:** representatives from the 6 participating colleges, 9 partner school boards, SCWI, ACAATO, MTCU and the Ministry of Education

CMP Project Components

- ❑ Analysis of College Policies and Programs (qualitative)
- ❑ Analysis of Student Data (quantitative)
- ❑ Forum in June to share findings and discuss implications
- ❑ Feasibility study of expanding to province wide analysis

College Policy and Program Analysis

- ❑ Grading Policies
- ❑ Admission Criteria
- ❑ Admission Testing
- ❑ Math Support
- ❑ Program Clusters
- ❑ College Program Analysis

Grading Policies

- ❑ Range of grading policies
- ❑ Rationalizing these grading policies into a CMP grading policy:

Grade	Mark Range
A	80-100
B	70-79
C	60-69
D	50-59
F	<50
Non-complete	W/WD/WP/WF.

Admission Criteria

- ❑ Minimum criteria for post secondary college programs
 - ❑ OSSD certificate or equivalent
 - ❑ Mature student status (Minimum of 19 yrs by enrolment date)
- ❑ Specific college criteria
 - ❑ Mathematics requirements
 - ❑ Science requirements

Admission Testing

- ❑ Colleges employ admission/placement testing
“To ensure that applicants and new students have the academic skills to succeed in their chosen program.”
- ❑ Fanshawe (locally developed)
- ❑ George Brown (Compass Technical Mathematics)
- ❑ Georgian (CPT by Accuplacer up until Jan 06)
- ❑ Seneca (ASET - locally developed)

Student Support

- ❑ Subsidized tutoring – group & individual
- ❑ Drop-in mathematics centres
- ❑ Other attempts to support students – additional classes conducted by faculty, use of placement tests & foundation mathematics courses

Program Clusters

- ❑ Rationalizing 119 programs & 35 courses
 - ❑ Mechanical Engineering
 - ❑ Construction
 - ❑ Electrical Engineering
 - ❑ Applied Sciences
 - ❑ Computer Studies

College Program Analysis

- ❑ Total number of programs & courses
- ❑ Examination by cluster according to:
 - ❑ Number of math courses
 - ❑ Textbooks
 - ❑ Course hours
 - ❑ Assessment methods
- ❑ Program Standards

College Program Analysis

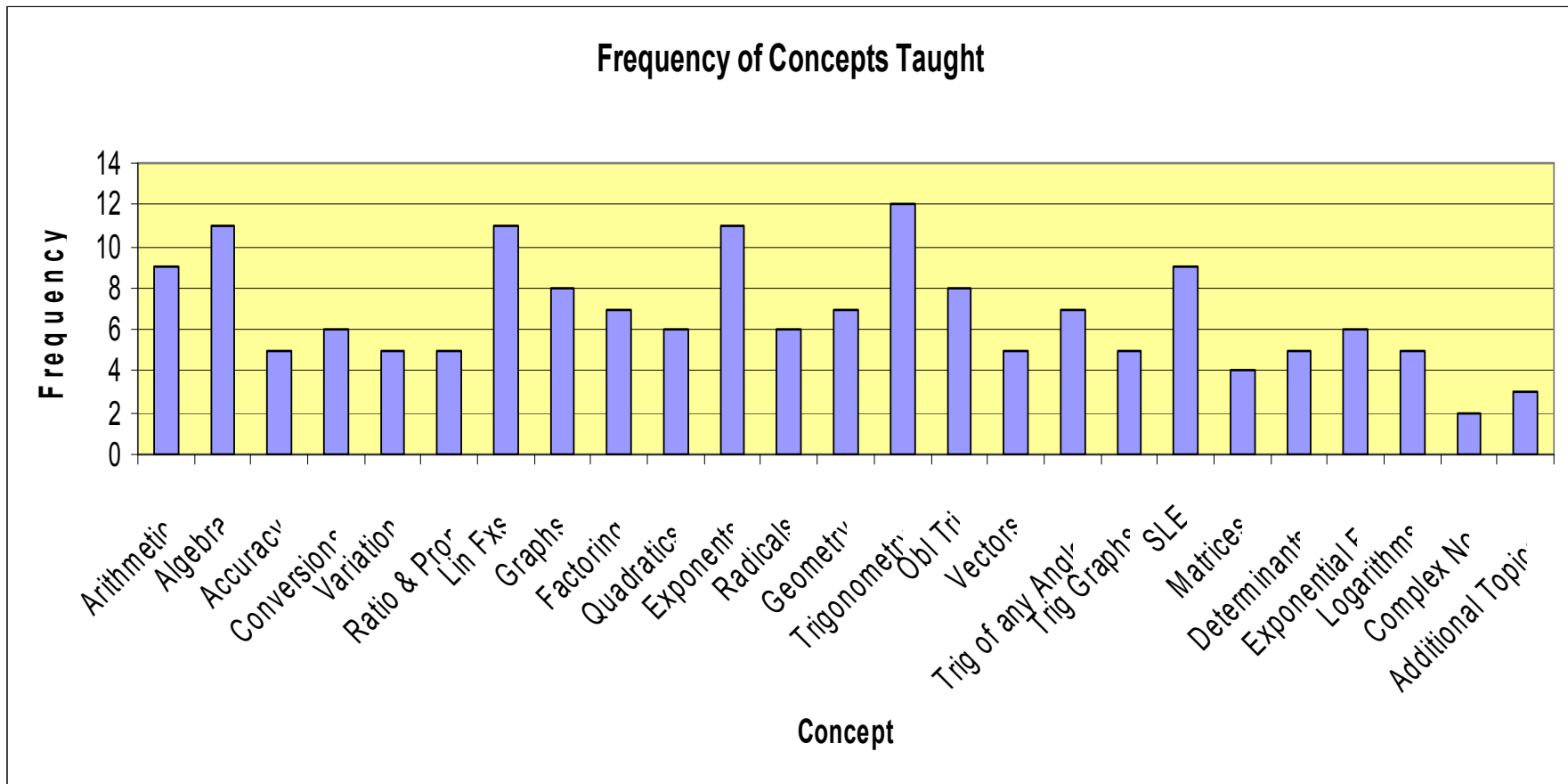
Number of programs and clusters

❑ Breakdown by college:

- C1– 24 programs: 4 math courses
- C2– 20 programs: 7 math courses
- C3– 23 programs: 13 math courses
- C4– 21 programs: 6 math courses
- C5– 14 programs: 3 math courses
- C6– 17 programs: 1 math course with variations;
1 remedial math course

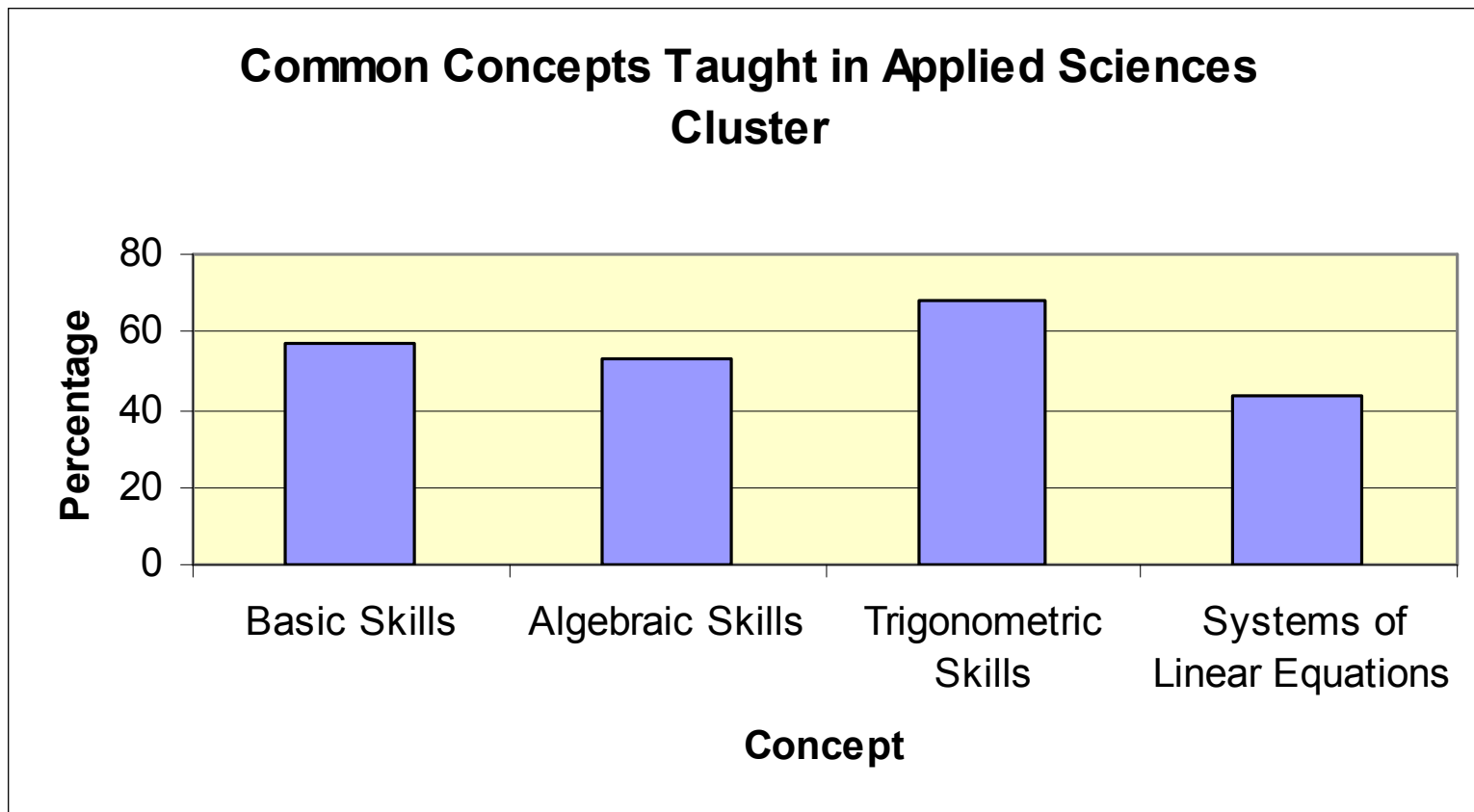
Math Course Summary

Charting similarities in programs



Program Cluster Analysis

An example with grouped topics



MTCU Program Standards

Vocational standards

- ❑ the vocationally specific learning outcomes which apply to the program in question

Generic skills (Essential employability skills)

- ❑ skills that are critical for success in the workplace, in day-to-day living, and for lifelong learning

General education standards

- ❑ the requirement for general education courses that applies to postsecondary programs

College Program Standards

- ❑ **What is the relationship between the expectations of MTCU standards and the mathematics courses?**
 - ❑ Total number of program standards in the engineering technology area: 36

College Program Standards

Mechanical Engineering Technician (2 yr) / Mechanical Engineering Technology (3 yr)

Standards specific to mathematics:

- ❑ **Vocational:** #1(a) Calculate and convert correctly in Imperial and SI measurement units using both manual methods and electronic technology
- ❑ **Generic:** #3 apply a wide variety of mathematical techniques with the degree of accuracy required to solve problems and make decisions.

College Program Standards

- ❑ While MTCU provides standards for these programs:
 - ❑ there is variation among Mechanical Engineering programs regardless of semesters of mathematics offered or length of program;
 - ❑ one semester math courses are longer than if a math course is taught in 2nd semester.

College Program Analysis

Math Courses by Cluster

- ❑ Proportion of programs with 1 semester of math:
 - ❑ Mechanical: 53%
 - ❑ Construction: 42.9%
 - ❑ Electrical: 30%
 - ❑ Applied Science: 28.6%
 - ❑ Computer Studies: 37.5%
- ❑ Variation exists among colleges as to which programs have 1 or 2 semesters of mathematics.
- ❑ Some program clusters include more mathematics in their program of study.

College Program Analysis

- ❑ **Are mathematics courses different between the 1-, 2-, and 3-year programs?**
 - ❑ Not necessarily since many colleges employ a laddering system where a student can move from a 1- to a 2-year program, or a 2- to a 3-year program.
 - ❑ There is variation among the courses by program length within clusters.

College Program Analysis

- ❑ **What are the resources used in the classroom?**
 - ❑ Calter: 14
 - ❑ Washington: 10
 - ❑ Handouts, etc: 7
 - ❑ Smith: 5
 - ❑ Other: 7

College Program Analysis

- ❑ **How many hours per mathematics course?**
 - ❑ Little difference in the average length of the math course if it is the only math taught.
 - ❑ Electrical engineering programs spend more time teaching concepts overall. Second, is applied sciences cluster. E.g. ~60 hours per semester.
 - ❑ If there are 2 semesters of math, the 1st semester math course tends to be shorter.

College Program Analysis

- ❑ **How is the mathematics assessed?**
 - ❑ Mathematics is assessed primarily through tests and final exams.
 - ❑ Other methods used: assignments and quizzes
 - ❑ Variation in weighting or methods used.

College Program Analysis

- ❑ What factors contribute to student achievement in college engineering technology programs?
- ❑ Can an analysis of courses inform us about student achievement?
- ❑ What is the role of curriculum, pedagogy, and assessment with respect to student achievement?

Analysis of Student Data

The analysis of student data involves:

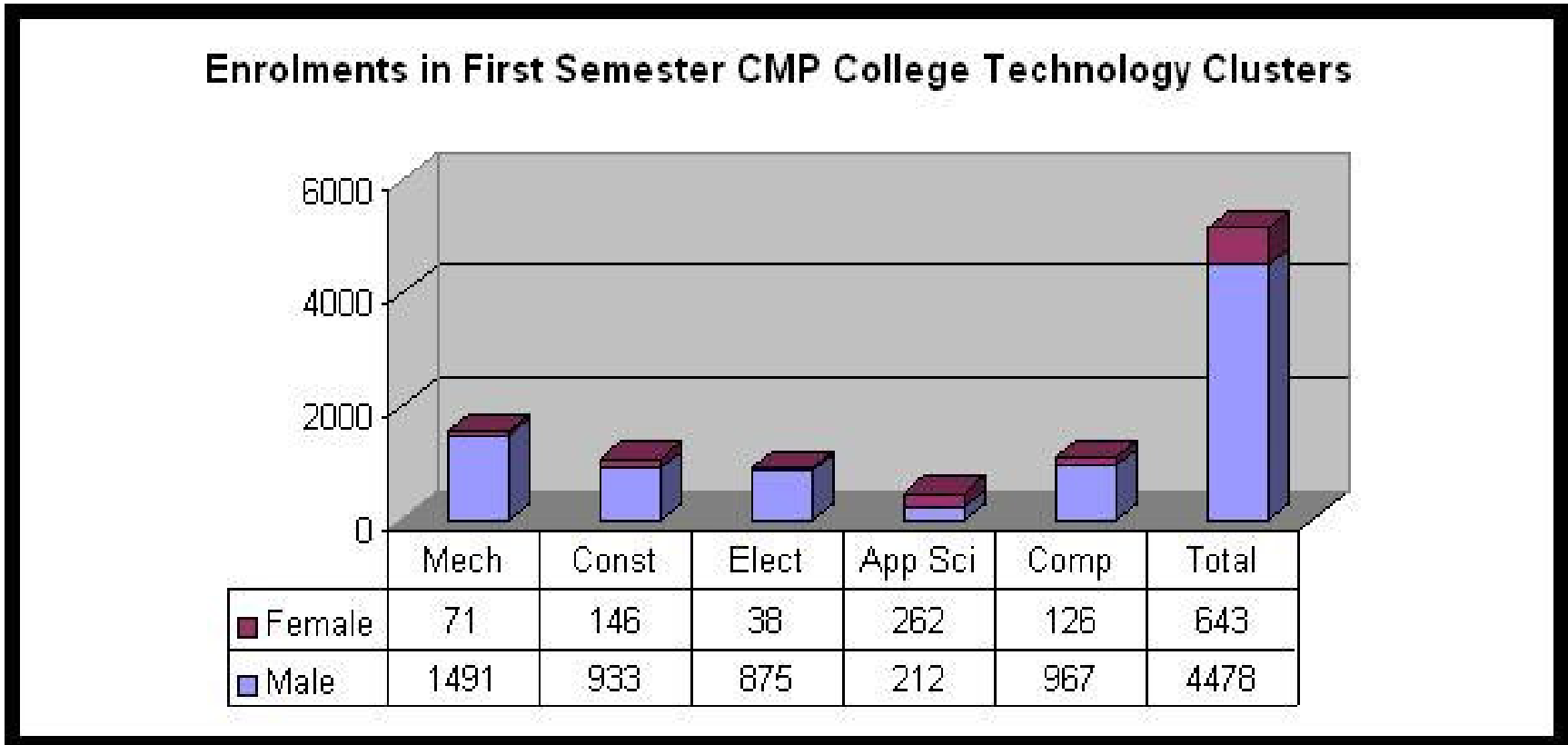
- ❑ Comparing achievement in secondary mathematics with achievement in first semester college mathematics
- ❑ Looking at pathways to determine which (if any) are more predictive of success
- ❑ Determining if there is predictive value to college assessment tests

Student Data Views

- ❑ Six main “sections” under which views are grouped:
 - ❑ A-Student Participation
 - ❑ B-Pass Rates
 - ❑ C-Grade Spreads
 - ❑ D-College Assessment Tests
 - ❑ E-Secondary School Pathways
 - ❑ F-School Board Performance

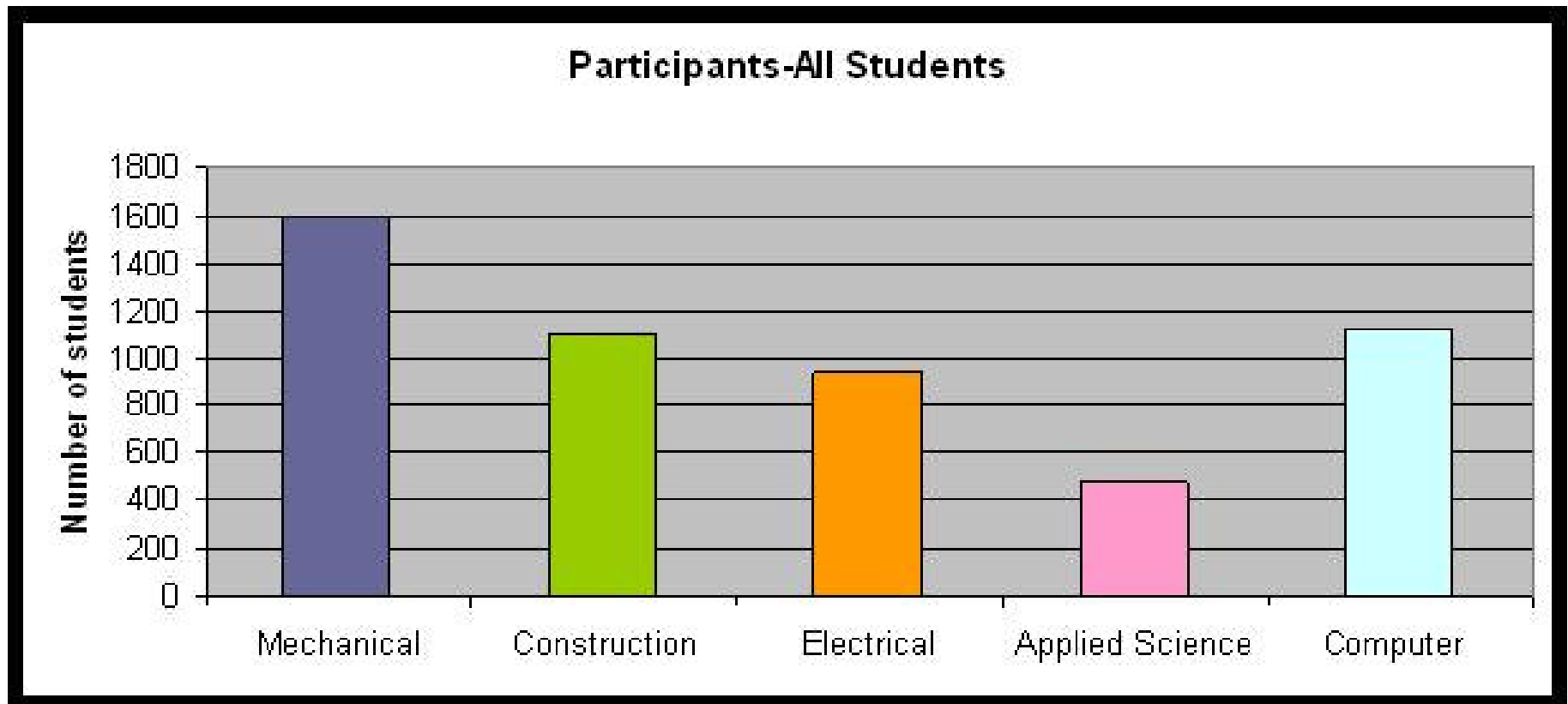
A-Student Participation*

*Does not include those individuals who did not declare gender



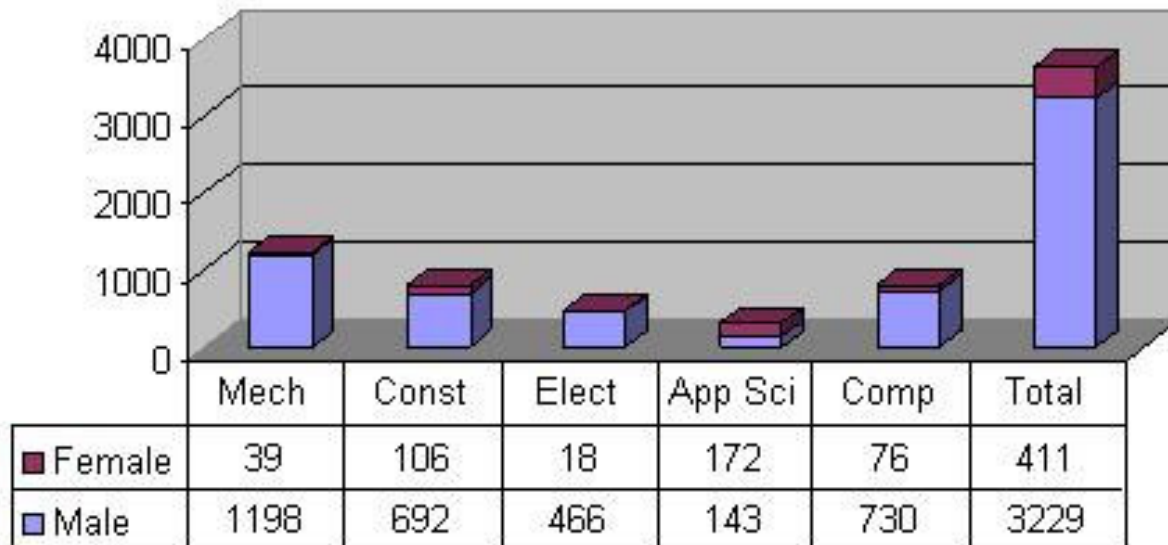
A- Student Participation*

*Includes all students



Student Participation

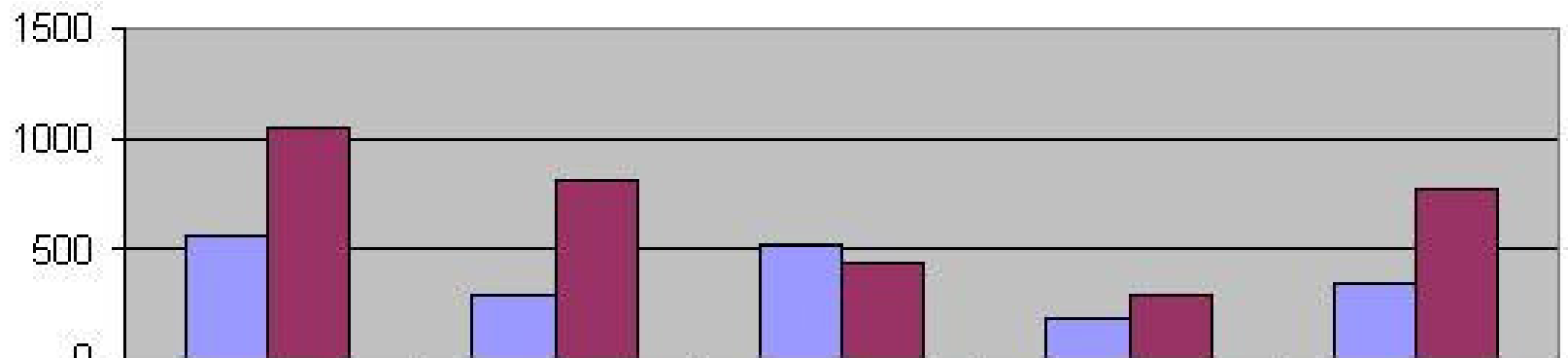
**Enrolments in First Semester CMP College Technology Clusters-
Age 23 and under**



Student Participation



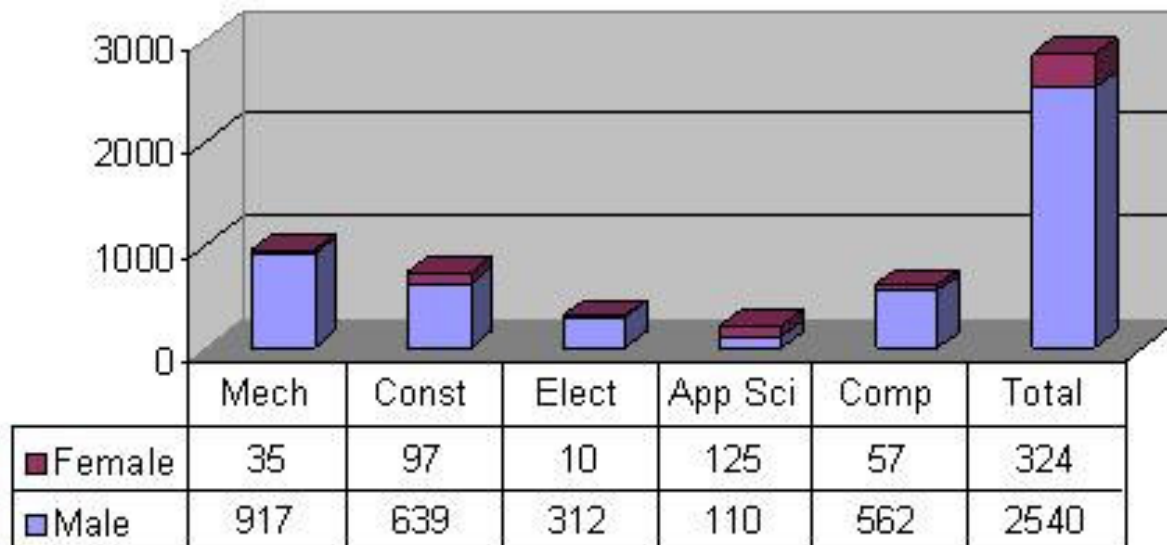
Comparison of Over 23 and 23 years of age and under



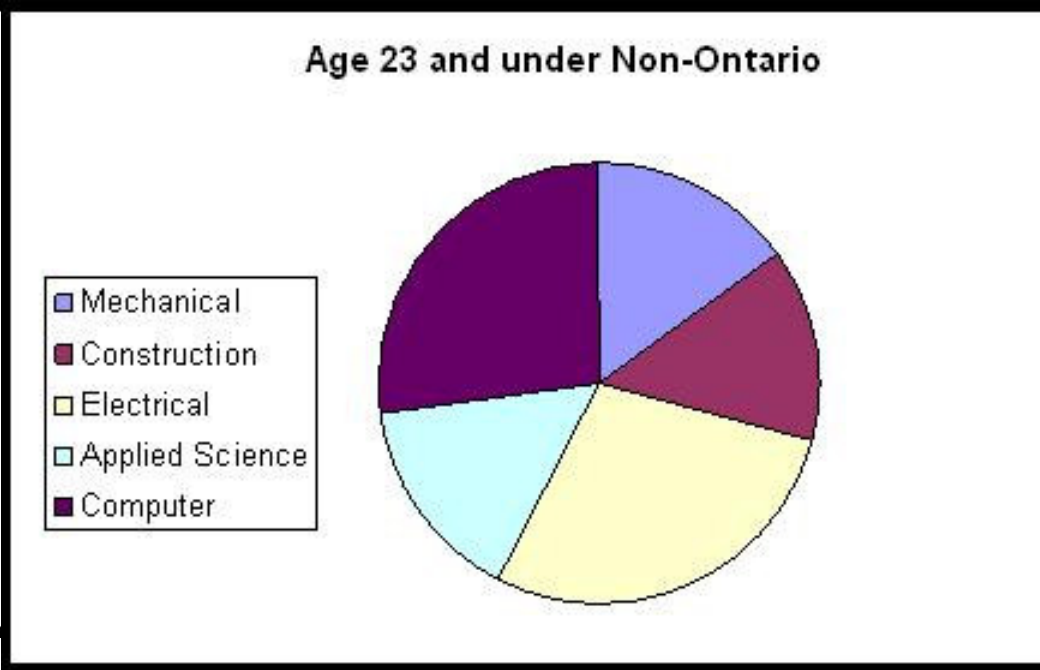
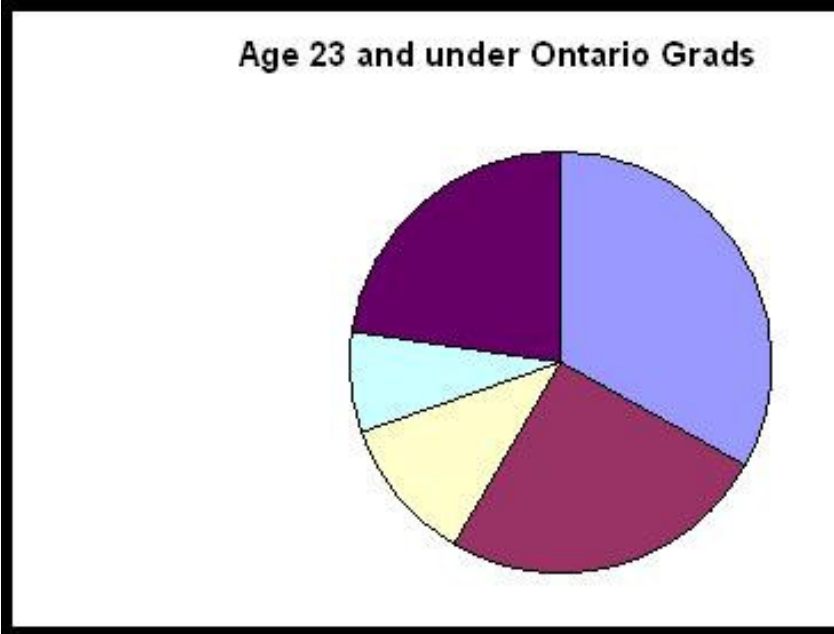
	Mechanical	Construction	Electrical	Applied Sciences	Computer
Over 23	549	285	511	183	342
23 and under	1047	811	433	294	779

Student Participation

**Enrolments in First Semester CMP College Technology Clusters-
Age 23 and under-Ontario Grads**



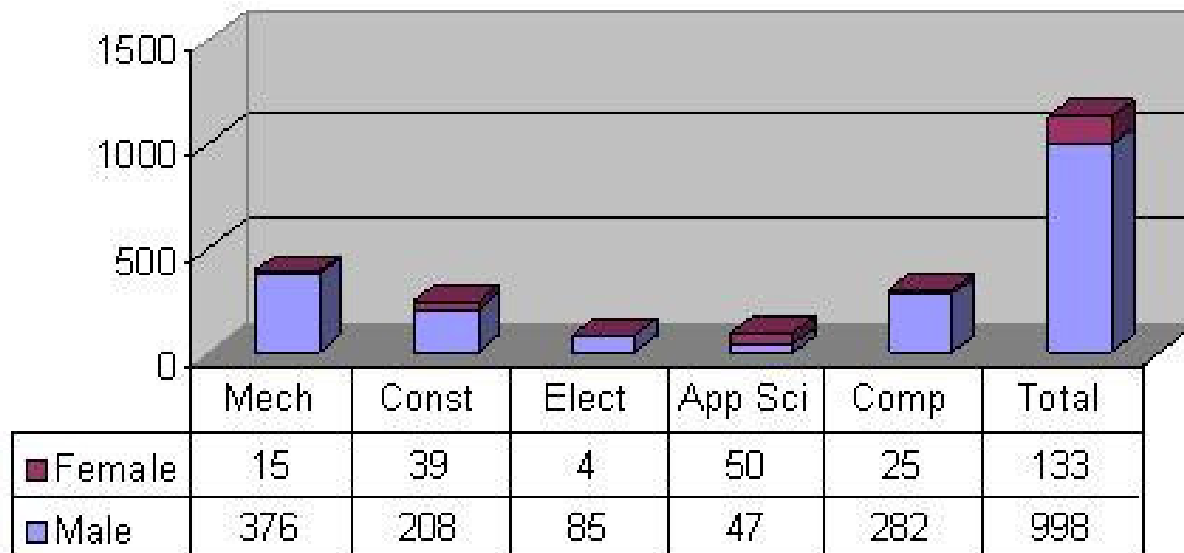
A3-Student Participation



- Mechanical
- Construction
- Electrical
- Applied Science
- Computer

Student Participation

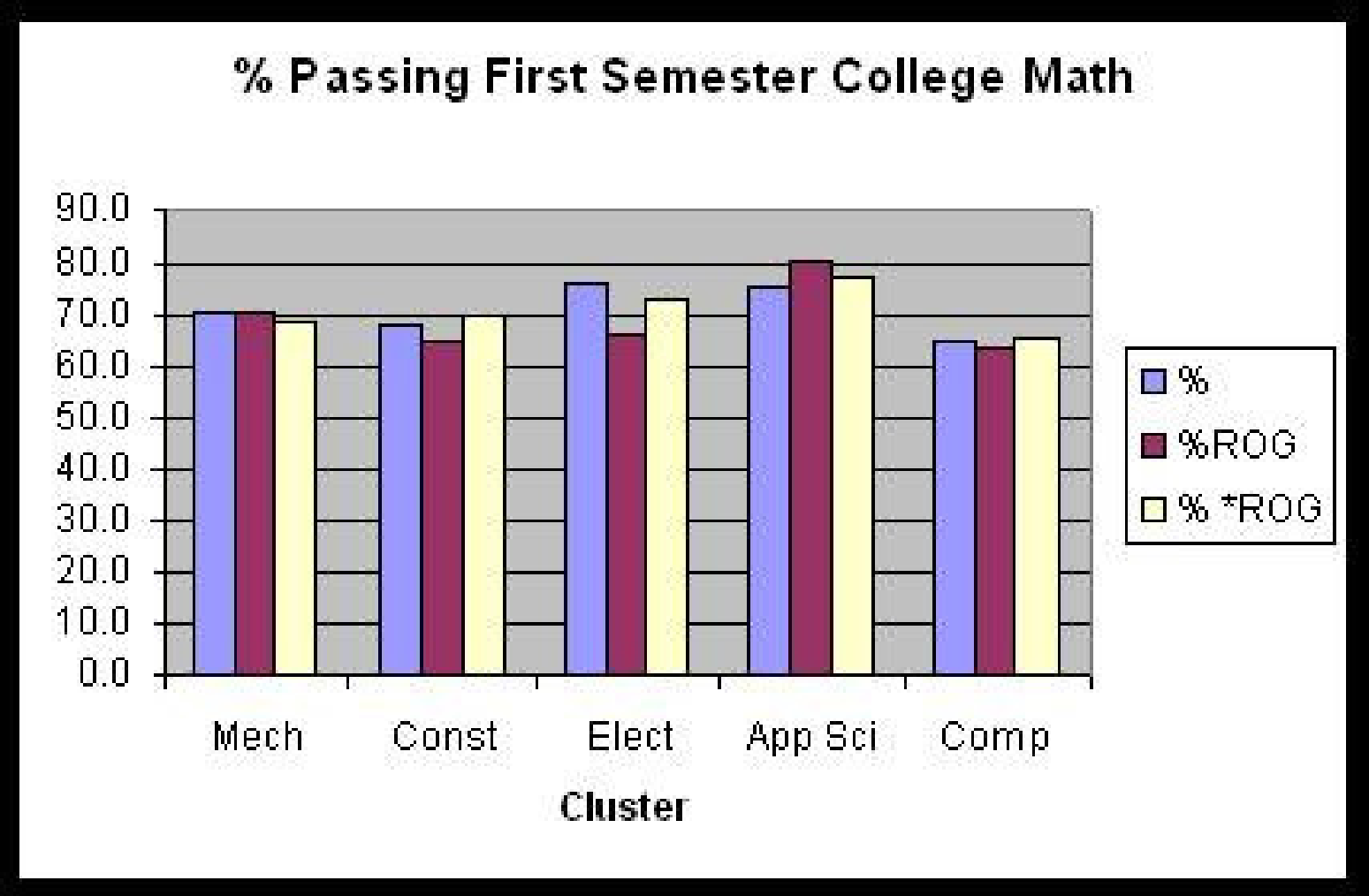
Enrolments in First Semester CMP College Technology Clusters-
Age 20 and under-Ontario Grads



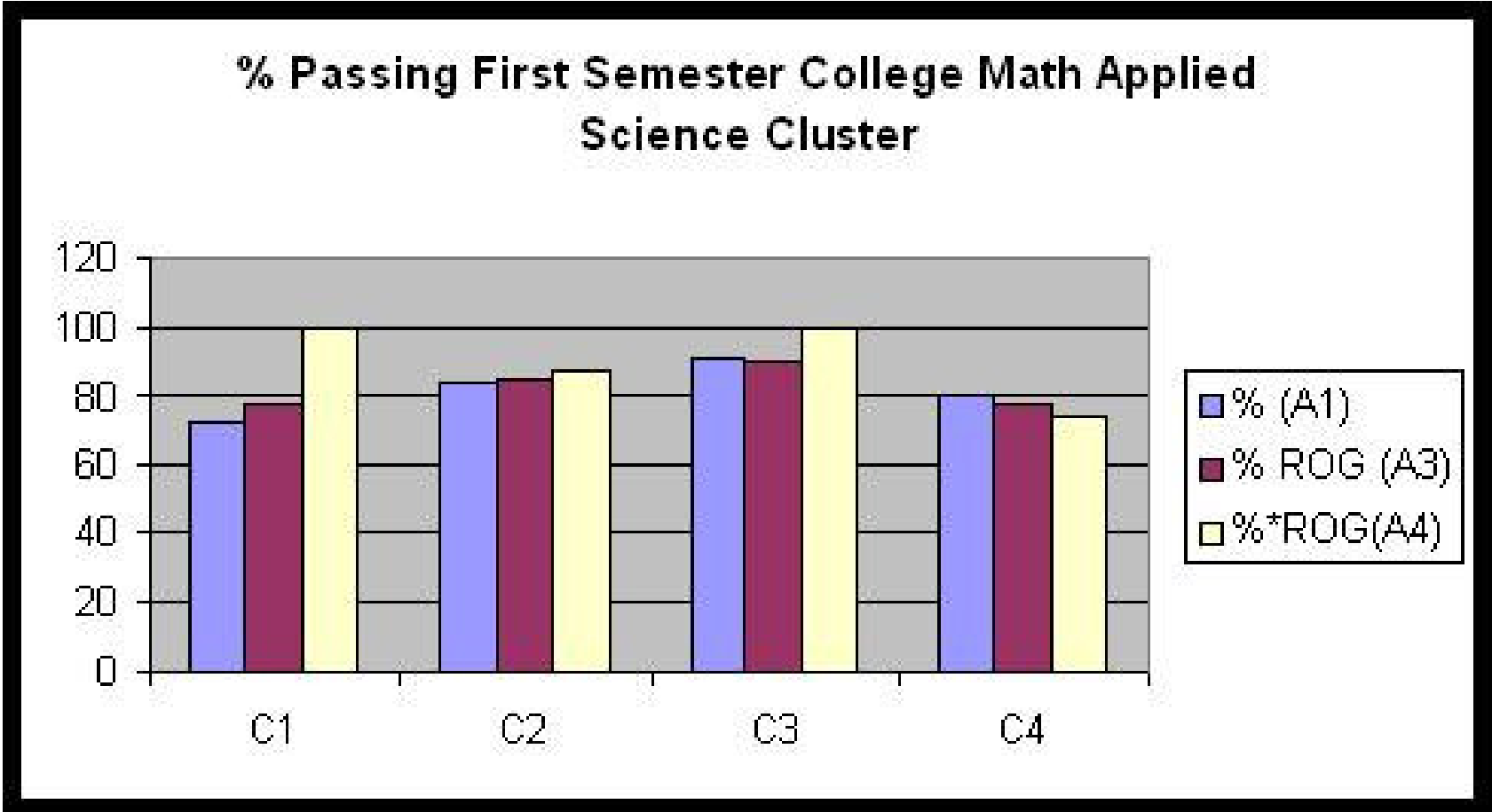
Terminology

- ❑ ROG = Recent Ontario Graduate, age 23 years and under
- ❑ *ROG = Recent Ontario Graduate, age 20 years and under
- ❑ "At Risk" = at risk of non completing college program

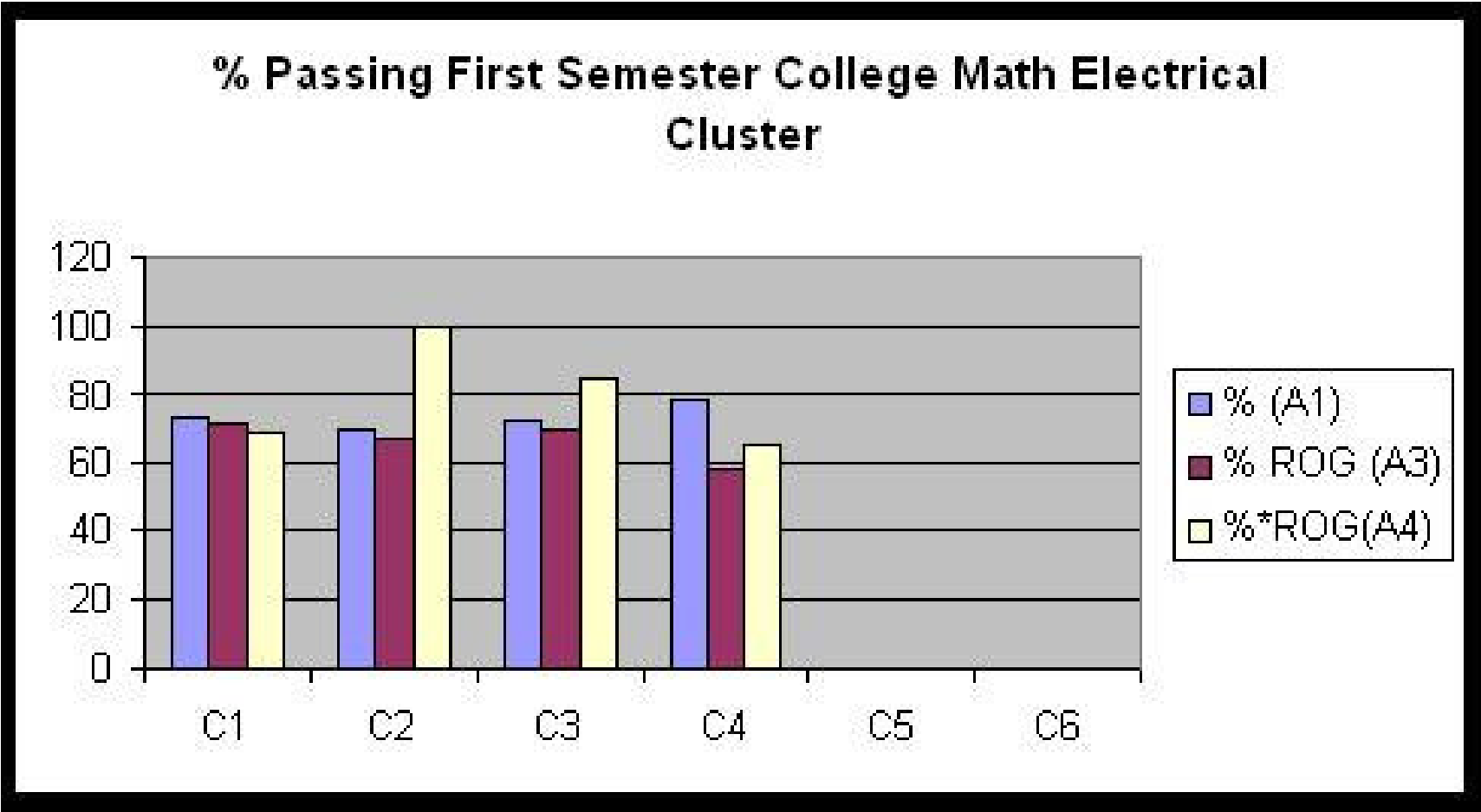
Pass Rates (Grades A-D)



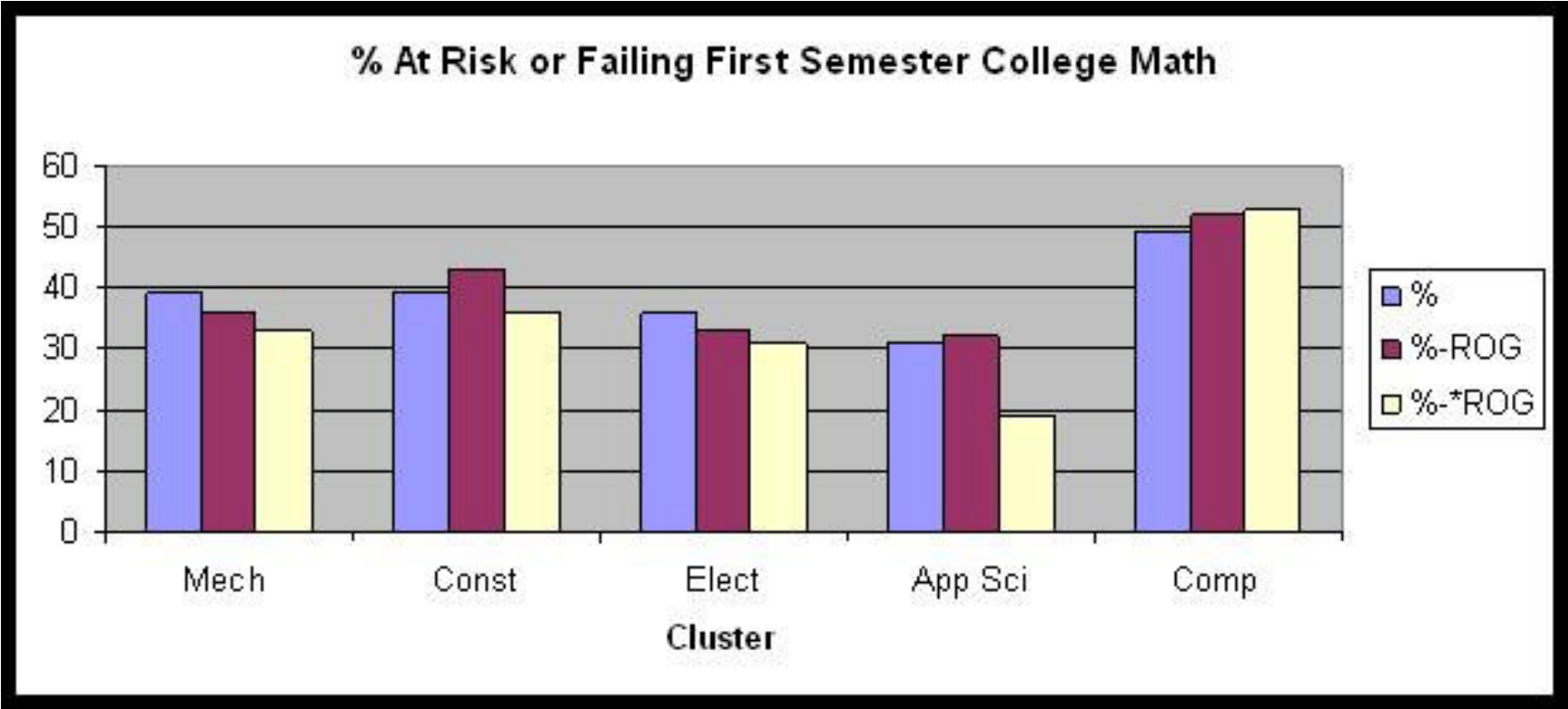
Pass Rates (Grades A-D)



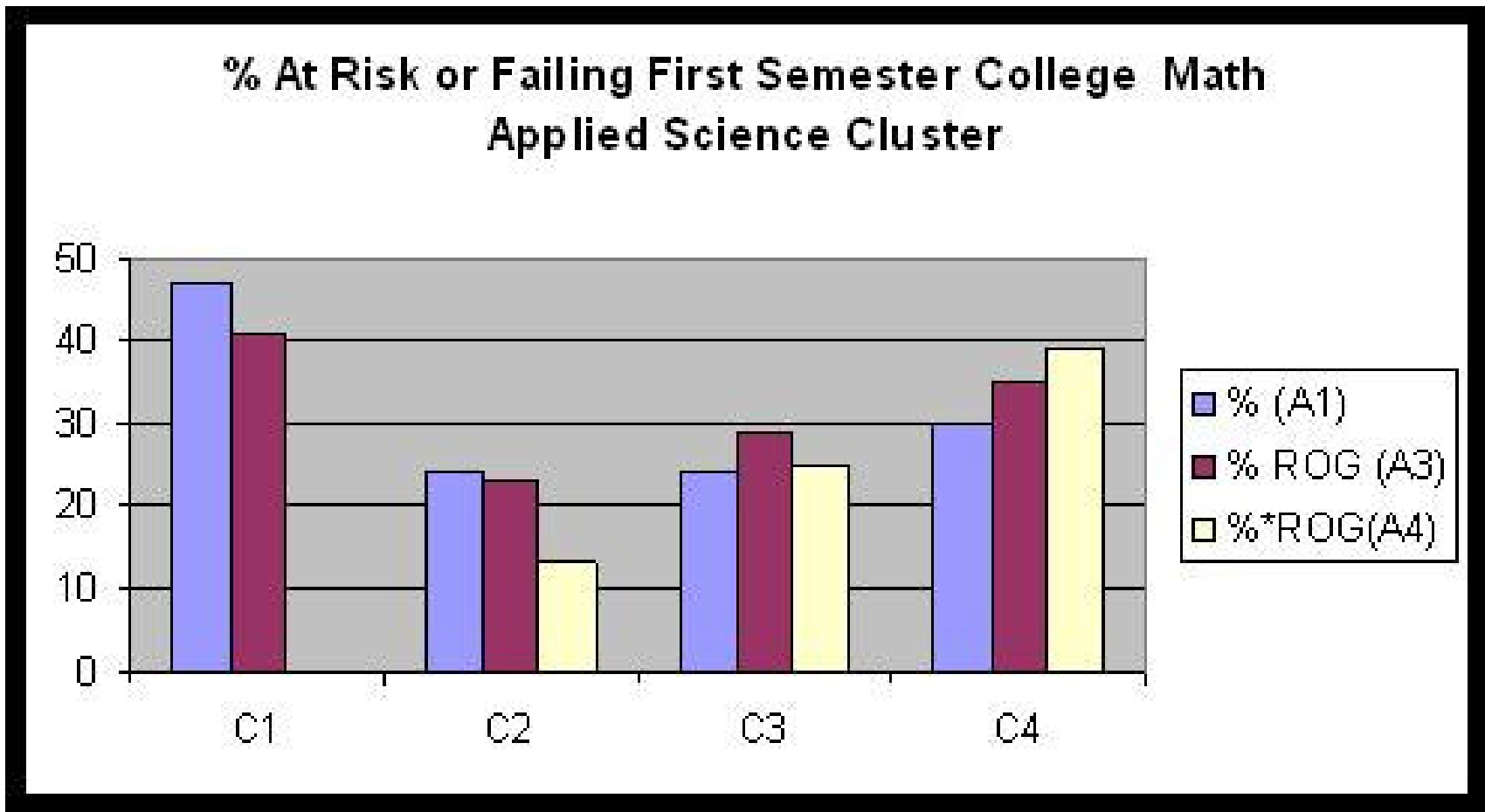
Pass Rates (Grades A-D)



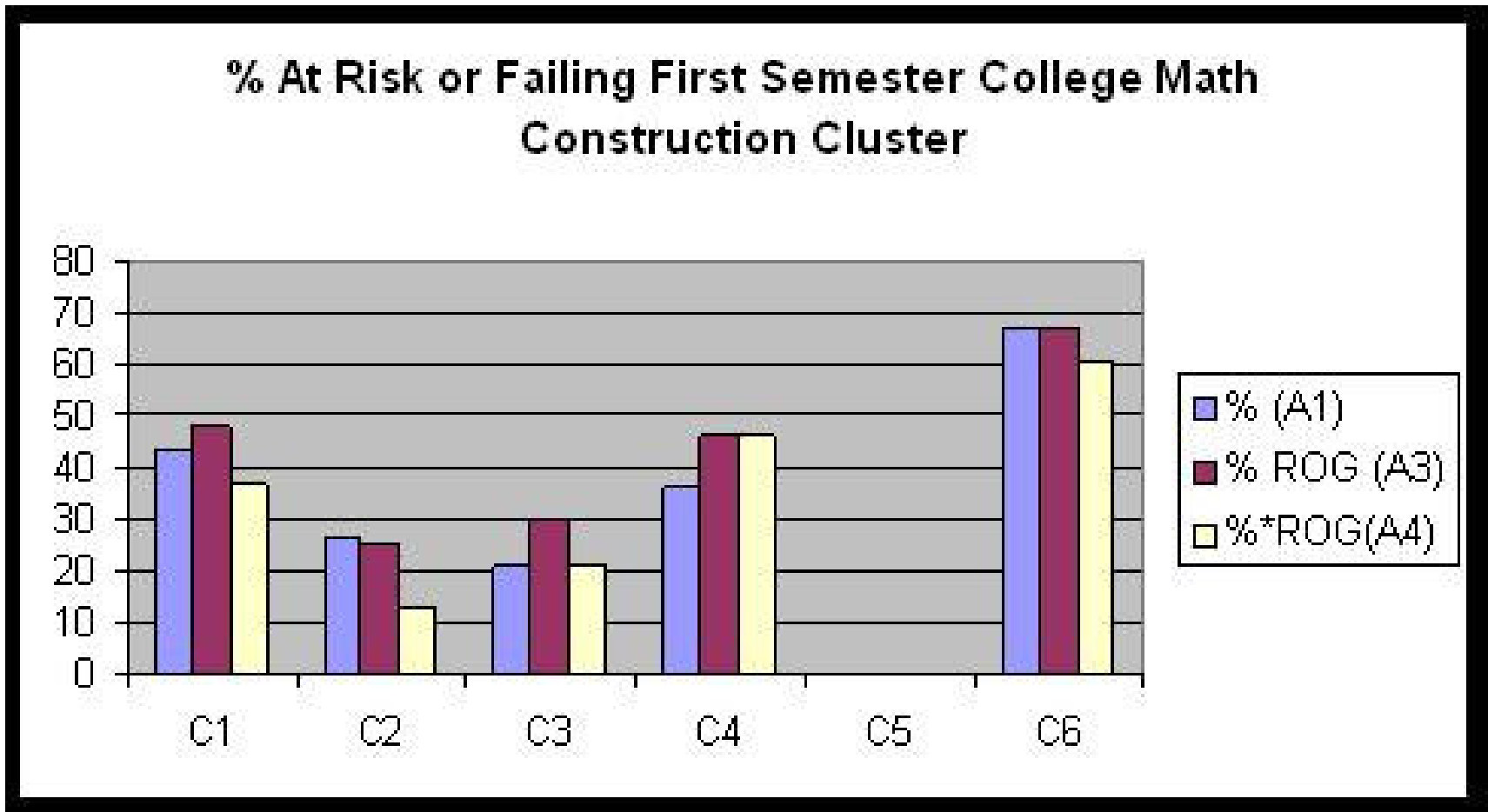
At Risk and/or Failing (Grades D,F, WD)



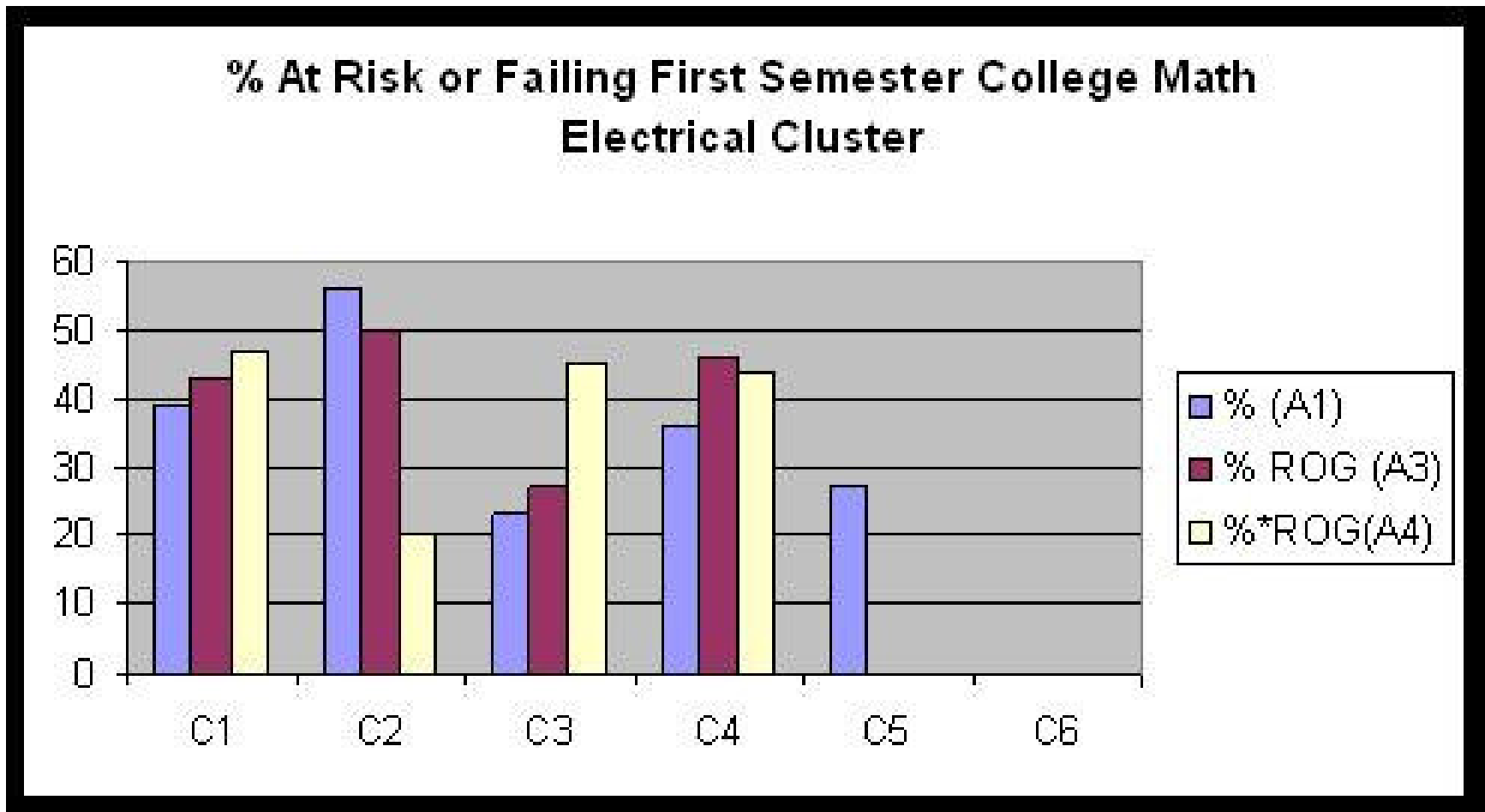
At Risk and/or Failing (Grades D,F, WD)



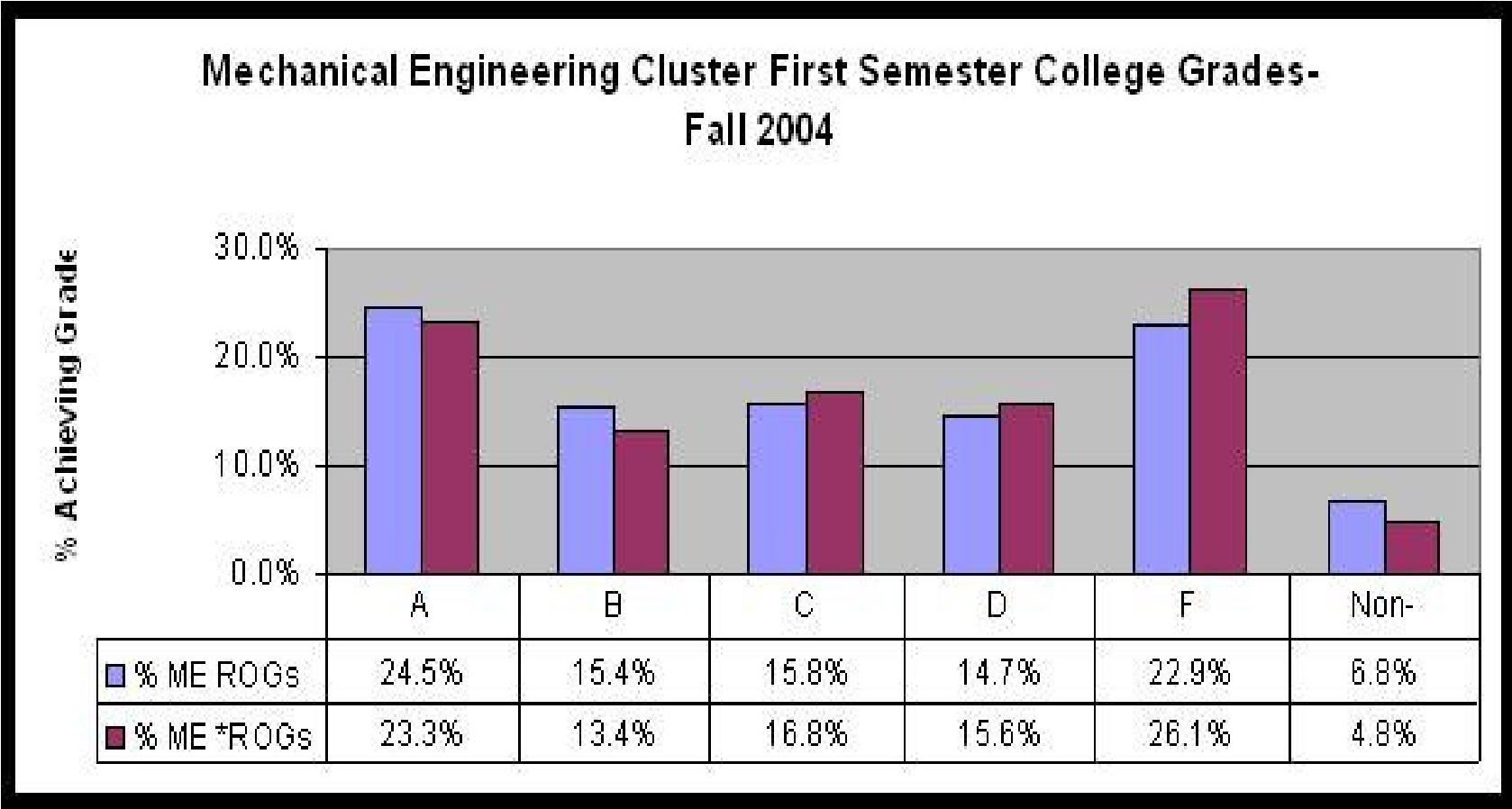
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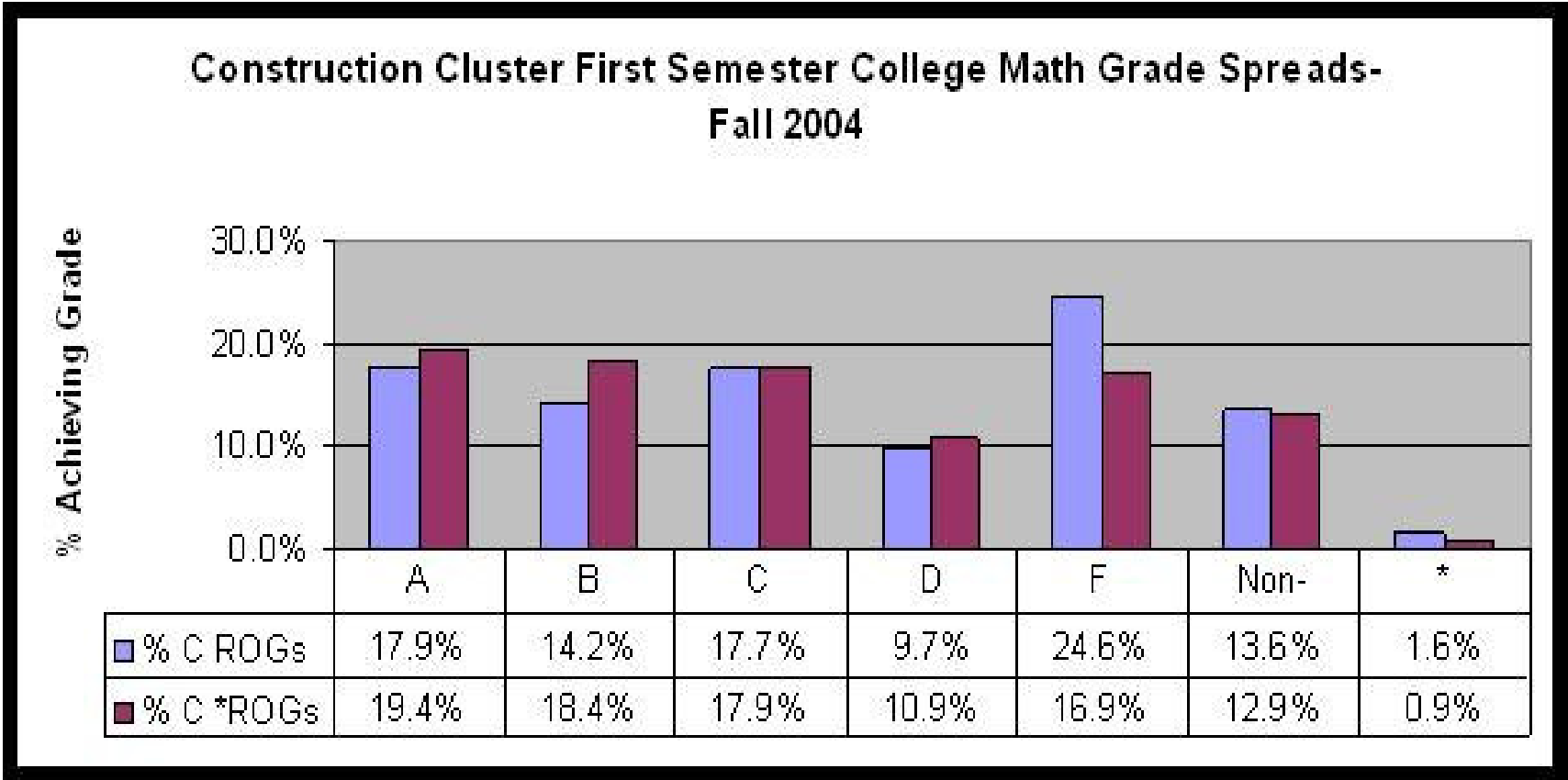
At Risk and/or Failing (Grades D,F, WD)



Grade Spreads-All Colleges

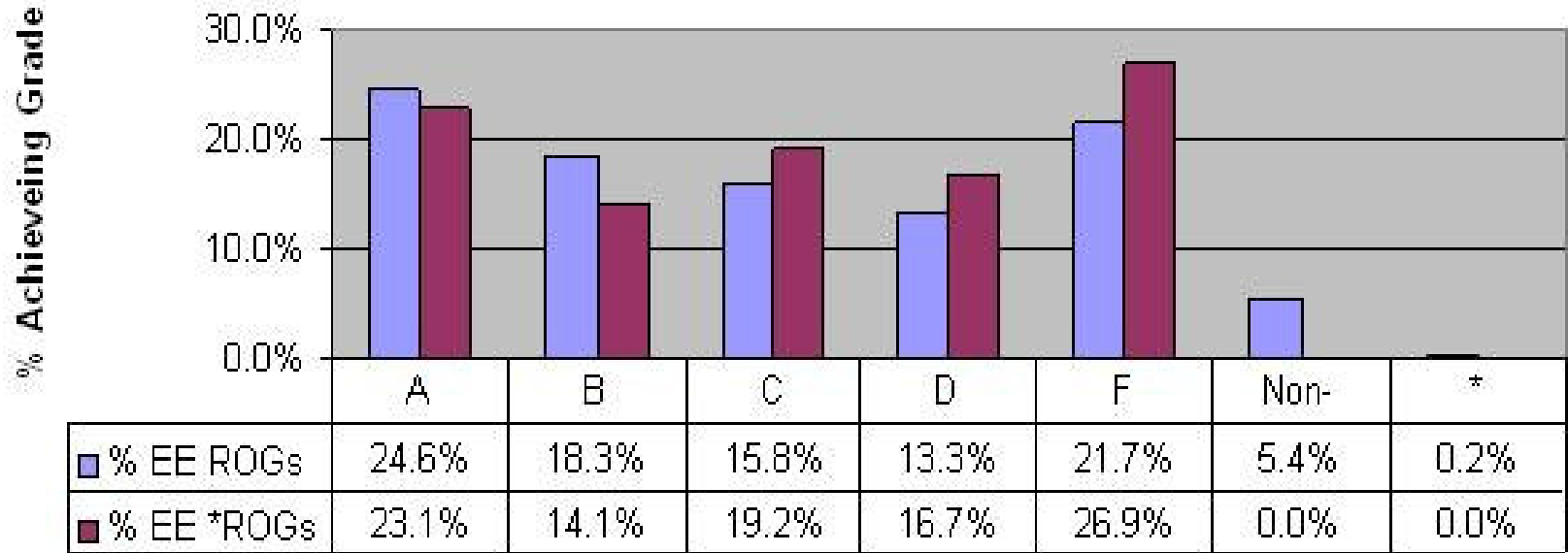


Grade Spreads-All Colleges

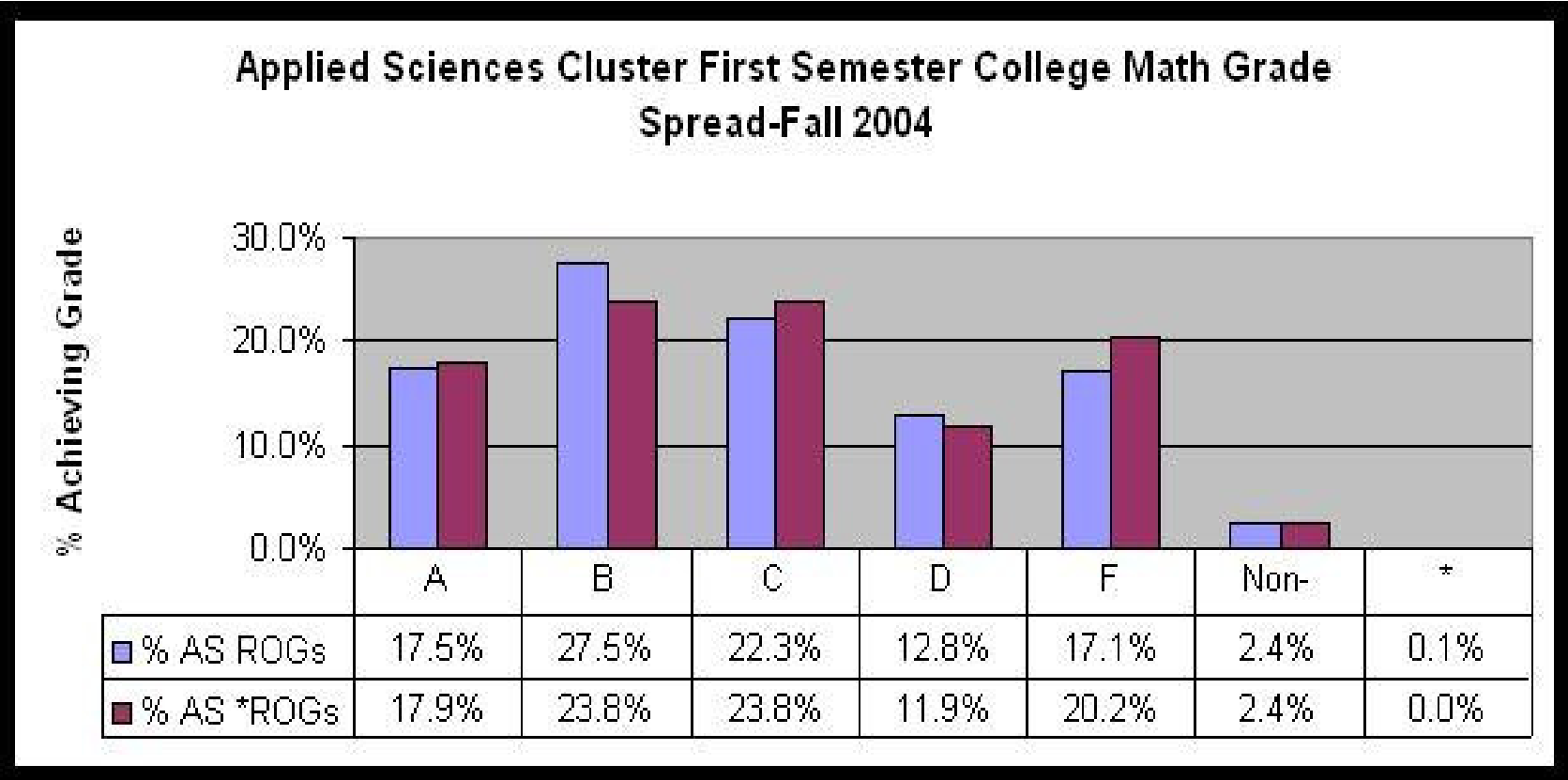


Grade Spreads-All Colleges

Electrical Engineering Cluster First Semester College Math Grade Spreads-Fall 2004



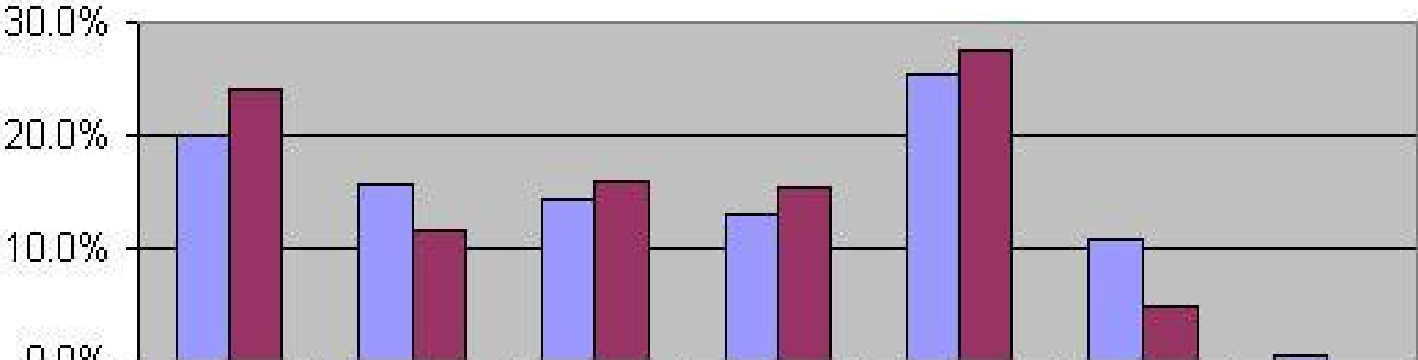
Grade Spreads-All Colleges



Grade Spreads-All Colleges

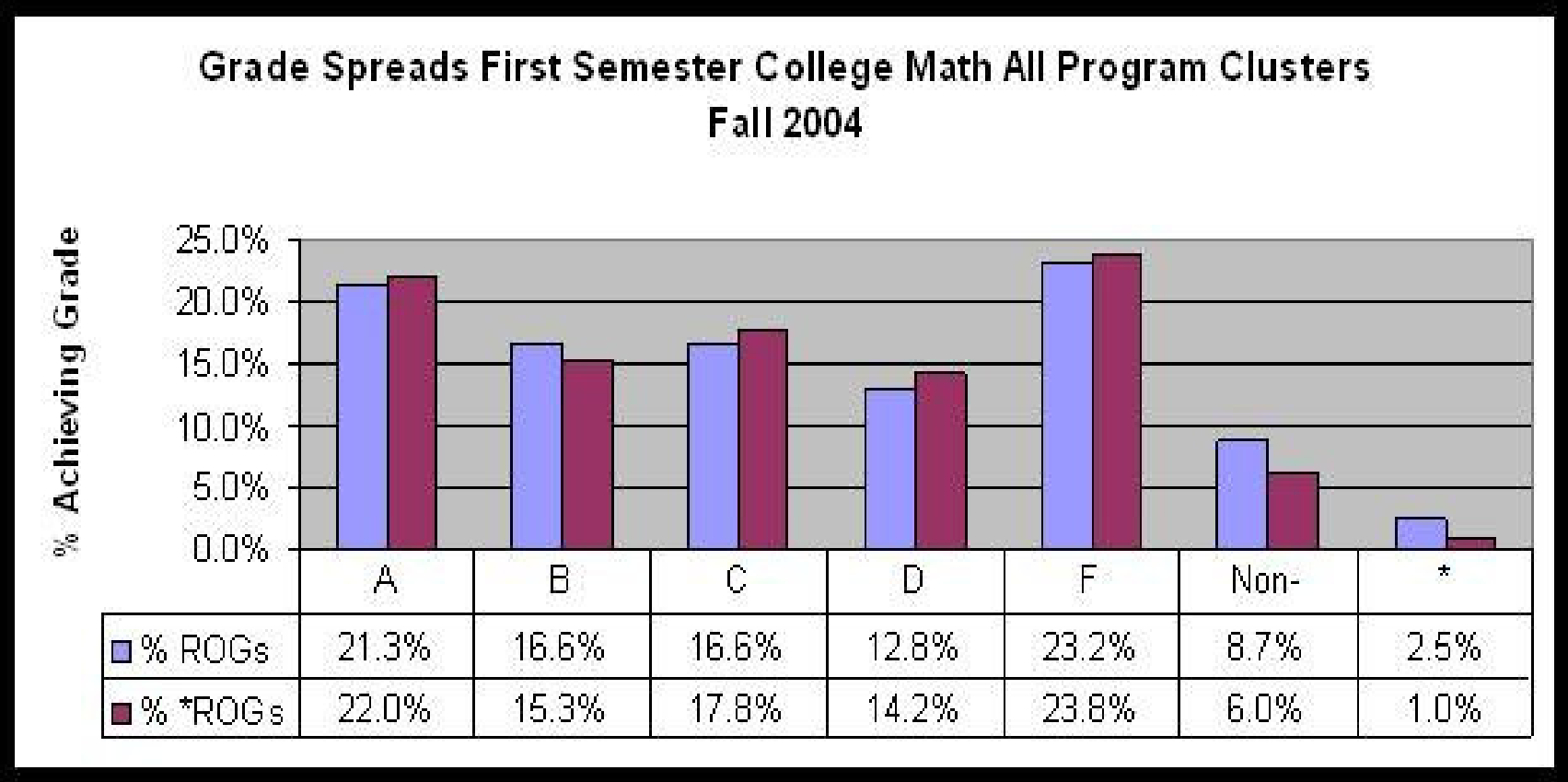
Computer Cluster First Semester College Math Grade Spreads-Fall 2004

% Achieving Grade



	A	B	C	D	F	Non-	*
% CS ROGs	20.0%	15.6%	14.3%	12.9%	25.5%	10.8%	0.5%
% CS *ROGs	23.9%	11.7%	16.0%	15.3%	27.6%	4.9%	0.1%

Grade Spreads-All Colleges



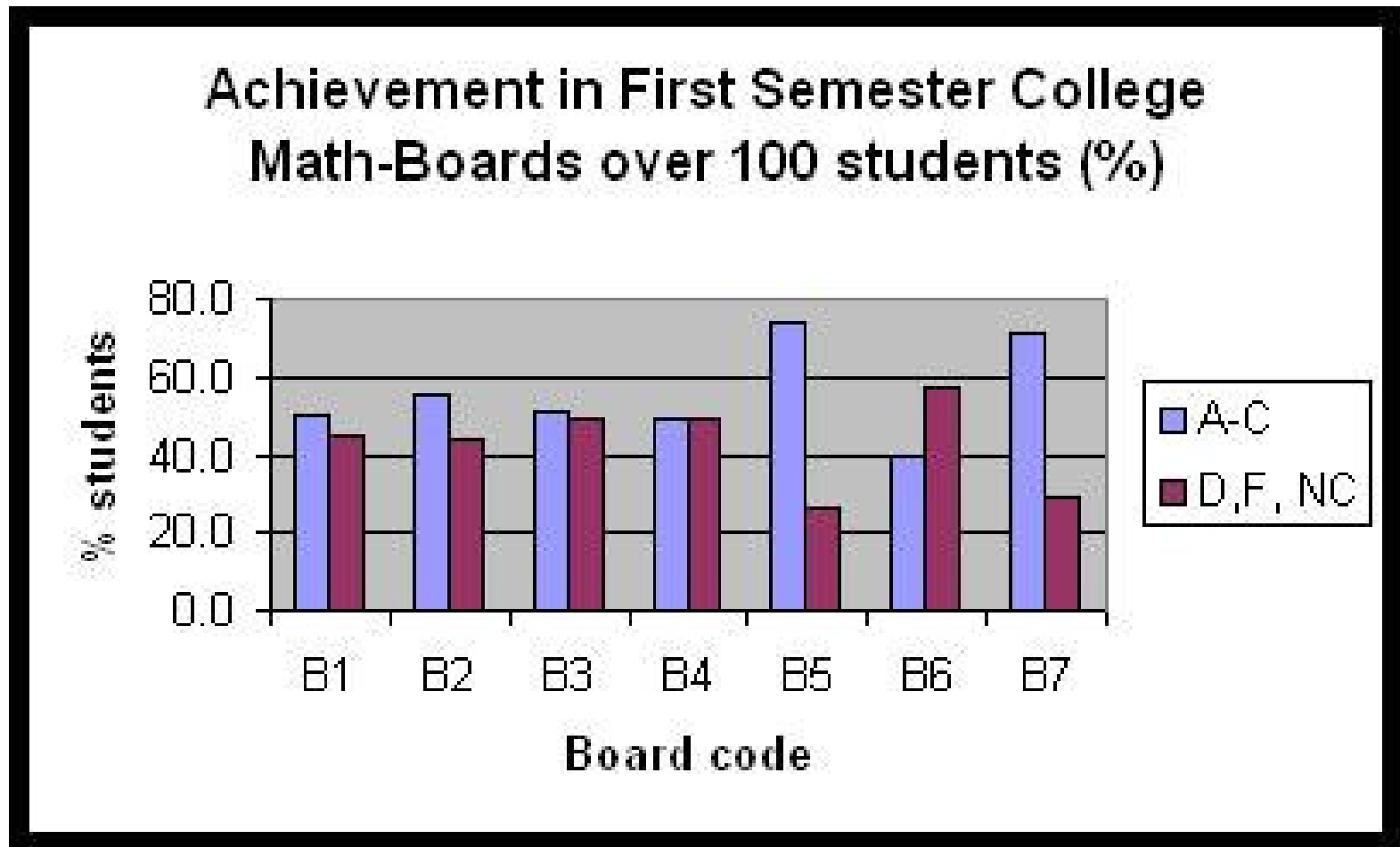
Pathways

- ❑ Huge number of possibilities-these were realised and then some!
- ❑ Unexpected and “illegal” pathways
- ❑ [Link to data file](#)

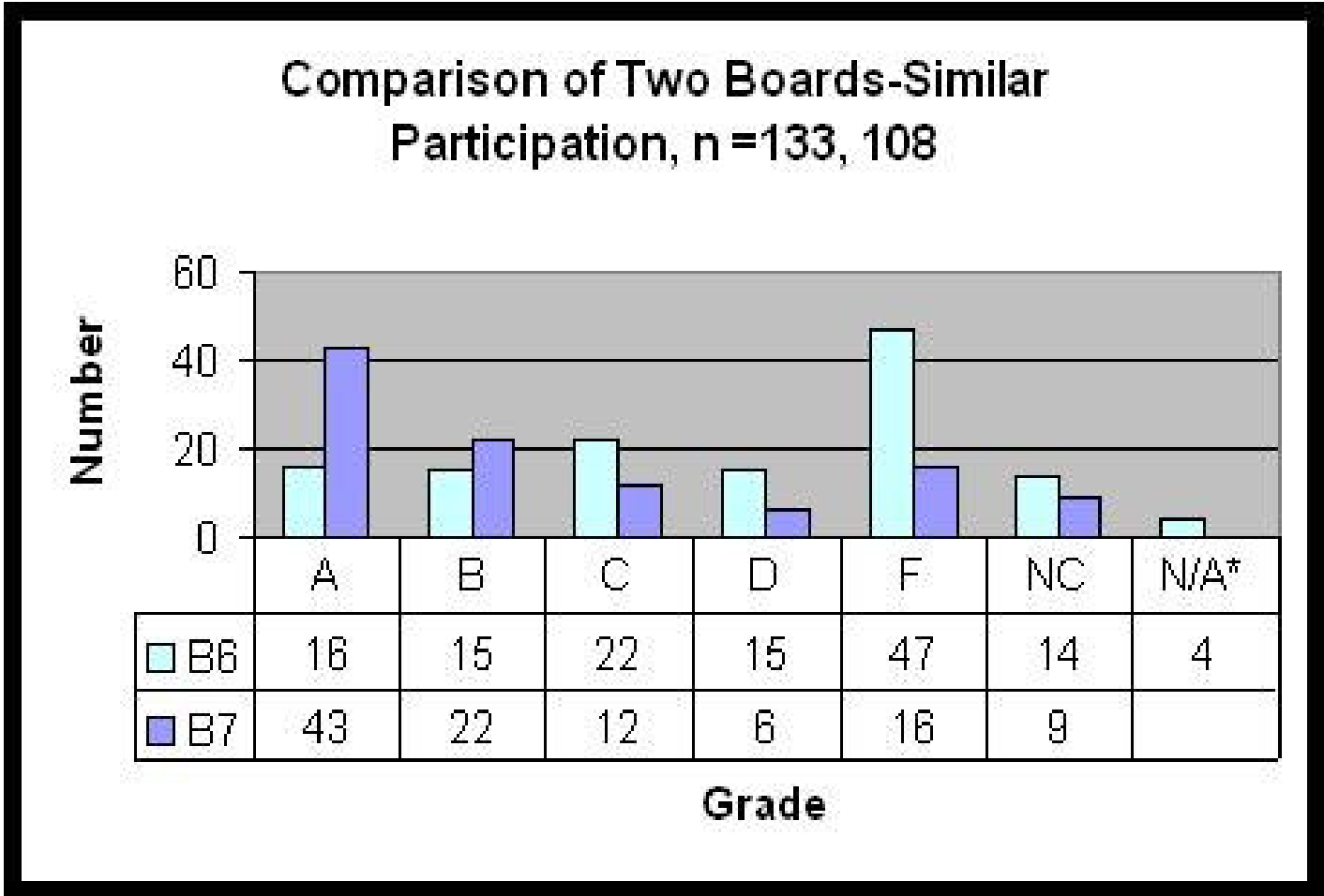
Secondary Math Grades against College Grades

- ❑ Conversion of Secondary School Math Grade (11 or 12 level) into CMP grade scale
- ❑ A look at each Grade 11 and 12 Math course
- ❑ Sample size limits

College Grades comparison by School Board



College Grades comparison by School Board



Challenges

- ❑ Missing grades, data not collected (or used)
- ❑ Data validation
- ❑ Variation in policy and practice: grading policies, admission requirements, program and subject content, etc.

Significance of CMP

- ❑ Provides the bridge between government ministries, colleges and the school boards with a focus on student success
- ❑ Allows informed discussion with all stakeholders
- ❑ Aligned with Accessibility, Quality and Accountability themes identified in “Rae report”; great potential for Higher Education Council.

Significance of CMP

- ❑ Model for any subject (interest from Heads of Language)
- ❑ Results used to effect curriculum change, encourage new pedagogical approaches and to measure impact of these changes
- ❑ Evaluation of assessment tools, intervention and remediation strategies, special programs/projects (e.g. dual credit, transfer credit)

Why are we here?

- ❑ To hear your thoughts on CMP and its value to the colleges and/or secondary schools
- ❑ To stimulate discussion regarding some of the “findings”
- ❑ To gauge interest in the study

Next Steps-Immediate

- ❑ Forum members will participate in breakout sessions exploring implications for the province, mathematics curriculum, career-guidance and student success
- ❑ Recommendations from each focused session will be recorded in “real time” and will be presented to the main forum and discussed
- ❑ Proceedings of the forum will be published and distributed to participants

Next Steps

- ❑ The “Ontario College Mathematics Project” proposal is being developed as part of the SCWI Phase 10 RFP; the project will involve more colleges and all first semester mathematics courses regardless of program (Business, Technology, etc).
- ❑ Each Regional Planning Team is encouraged to include the project in its submission